

# **Method and Apparatus for Learning Probabilistic Relational Models Having Attribute and Link Uncertainty and for Performing Selectivity Estimation Using Probabilistic Relational Models**

5

## **ABSTRACT**

The invention comprises a method and apparatus for learning probabilistic models (PRM's) with attribute uncertainty. A PRM with attribute uncertainty  
10 defines a probability distribution over instantiations of a database. A learned PRM is useful for discovering interesting patterns and dependencies in the data. Unlike many existing techniques, the process is data-driven rather than hypothesis driven. This makes the technique particularly well-suited for exploratory data analysis. In addition, the invention comprises a method and  
15 apparatus for handling link uncertainty in PRM's. Link uncertainty is uncertainty over which entities are related in our domain. The invention comprises of two mechanisms for modeling link uncertainty: reference uncertainty and existence uncertainty. The invention includes learning algorithms for each form of link uncertainty. The third component of the  
20 invention is a technique for performing database selectivity estimation using probabilistic relational models. The invention provides a unified framework for the estimation of query result size for a broad class of queries involving both select and join operations. A single learned model can be used to efficiently estimate query result sizes for a wide collection of potential queries across  
25 multiple tables.